The process referred to for separating these several ingredients from each other yielded, in fact, a pure metallic button, not malleable, but uniting readily with all the other metals that have been tried, except mercury, and whose specific gravity appeared not less than 11. This is the rhodium, which is here announced for the first time.

The palladium was precipitated from the alcohol employed for washing the salt of rhodium: it was yielded, indeed, in a very small proportion, but in sufficient quantity, however, to prove that it is actually a simple metal residing in platina, and to induce a suspicion of some error in Mr. Chenevix's investigation, who thought it a compound of platina and mercury; but our author candidly adds, that he has made several attempts to imitate the synthetical experiments of that chemist by solution and amalgamation, but without success.

The Croonian *Lecture on Muscular Motion. By* Anthony Carlisle, *Esq. F.R.S.* Read November 8, 1804. [*Phil. Trans.* 1805, *p.* 1.]

Admitting that there are subjects in the economy of nature which will ever elude our most attentive observation, and that many institutions similar to our Croonian Lecture will probably never attain the end for which they were founded, it cannot, however, be denied that several of them, and ours in particular, have at different times brought forward various collateral, and some of them not unimportant facts, which have in some measure contributed to extend our knowledge of nature. This latter is the point of view in which the present communication is to be considered; concerning which the author says, that, waving the investigation of the general theory of muscular motion, he shall limit his present inquiry to certain circumstances which are connected with this motion, considered as causes, or rather as a series of events, all of which contribute more or less as essential requisites to the phenomena. The changes which obtain in muscles during their contractions or relaxations, and their corresponding connexions with the vascular, respiratory, and nervous systems, are, he declares, the chief objects of his present investigation.

The lecture is divided into six sections, of which the following are the heads, together with some of the most prominent facts contained under each of them; the nature of the performance, which consists chiefly of insulated facts, and our limits in point of time, precluding us from being so minute in our analysis as the importance of the subject may be thought to require.

Sect. 1. *Of the physical and sensible properties of muscles, considered as distinct parts of an animal, and as peculiar organs.*—In describing the fasciculated texture of the fibres which compose a muscle, and the elasticity of these fibres during the contracted state of the muscle, the author advances an opinion, that this elasticity appears to belong to the enveloping reticular or cellular membrane, and that it may be safely assumed that the intrinsic matter of muscle is not elastic.

The attraction of cohesion in the parts of muscle appears to be strongest in the direction of the fibres, and to be double that of the contrary or transverse direction. When muscles cease to be irritable, this attraction in the direction of the fibres is diminished; but it remains unaltered in the transverse direction.

When muscles act more powerfully or more rapidly than is proportionate to the strength of the sustaining parts, they do not usually rupture their fleshy fibres, but generally break their tendons, or even an intervening bone; whence it is inferred, that the attraction of cohesion is more active and powerful in the contracted state of the muscle than during its relaxed or passive state.

The muscular parts of different classes of animals vary materially in colour and texture; and such variations occur not unfrequently in different parts of the same individual.

Sect. 2. *Of the anatomical structure of muscles, and their relations with other parts of the animal body.*—The lecturer in this section professes to give no more than a rapid sketch of the history of muscular structure. One example of the origin of a muscle he deduces from the process of the incubated egg: but here it remains doubtful whether the rudiments of the punctum saliens be part of the cicatricula organized by the parent, or merely a structure resulting from the first process of incubation. The anatomical structure of muscular fibres, he next observes, is generally complex, according as they are connected with membrane, blood-vessels, nerves, and lymphæducts; which seem to be only appendages of convenience to the essential matter of muscle.

A muscular fibre, being carefully inspected in a powerful microscope, is found to be a solid cylinder, the covering of which, as had already been intimated in a previous part of the lecture, is a reticular membrane, and the contained part a pulpy substance, irregularly granulated, and of scarce any cohesive power when dead.

The arteries articulate copiously upon the reticular coat of the muscular fibre; they anastomose with corresponding veins; but this continued canal is not supposed to act in a direct manner upon the matter of muscle. In what manner the capillary arteries terminating in the muscular fibre may effect all the changes of increase in the bulk or number of fibres, in the replenishment of exhausted materials, and in the repair of injuries, is as yet matter of conjecture; but these arteries, it is thought, must be secretory vessels for depositing the muscular matter, the lymphæducts serving to remove the superfluous fluids and the decayed substances which are unfit for use. These lymphæducts appear to receive the fluids they contain, not, as has been represented, from the projecting open ends of tubes, but from the interstitial spaces formed by the reticular or cellular membrane.

The functions of nerves in the muscular system are the next object of contemplation. These also, it seems, terminate in the reticular or cellular membrane, the common integument, and the connecting medium of all the dissimilar parts of an animal. We have to regret

that we cannot dwell longer on this curious part of the lecture, especially where it treats of the combination, by means of nerves between animated and what may be deemed inanimate matter, as in the instances of bones, shells, teeth, and other extravascular and insensible substances, which, when completed, are no longer alterable by the animal functions.

Sect. 3. *Of the connexions between the functions of muscles and the temperature and respiration of the animal.*—That different parts of an animal are susceptible of different degrees of temperature, is a fact which stands in no need of demonstration; and it is equally obvious that every animal, besides being susceptible of the external changes of temperature, possesses also the power of generating heat within itself. This last-mentioned power is ascribed, in a great measure, to respiration; and this opens a field of inquiry, in what manner and to what degree the different classes of animals are possessed of that faculty. In this disquisition we find, among other interesting facts, a curious account in what manner hybernating animals are enabled to subsist several months without respiration.

The irritability of the heart, we are next told, is inseparably connected with respiration, and the blood appears to be the medium of conveying heat to the different parts of the body; and hence it is naturally inferred, that the changes of animal temperature in the same individual are always connected with, and proportionate to, the velocity of the circulation. After death, the blood of an animal is presently coagulated, and the muscles are usually contracted; but, from some observations here stated, it appears that the final contraction of muscles is not inseparable from coagulation of the blood within them, nor of a change in the reticular membrane. Lastly, it is asserted, that the reiterated influx of blood is not essential to muscular irritability; since the limbs of animals, separated from the body, continue for a long time afterwards capable of contractions and relaxations.

Sect. 4. *Of the application of chemistry to this subject.*—Our lecturer asserts, under this head, that the constituent elements of both animal and vegetable substances are not separable by any chemical process hitherto instituted, in such a manner as to admit of a synthetical re-combination: and he maintains, that, until such a recombination can be effected, all chemical discussions and investigations on the matter of muscles are not likely to afford any conclusive illustration.

Sect. 5. *Facts and experiments tending to support and illustrate the preceding arguments.*—We meet here with a number of observations on the heat of the blood and viscera of animals of different classes; also on the effects of crimping fish, which produces not only a sensible rigidity or contraction, but also an increase of specific gravity, in the muscles. Muscular fibres of quadrupeds, being immersed in water of a low temperature, gave also manifest proofs of contractions occasioned thereby. In the heat of 100°, the muscles of cold-blooded animals, and at 110° those of the warm-blooded, fall into the con-

tractions of death. The latter always contain more red particles in their substance than those of cold blood, and are sooner deprived of their irritability, even though their relative temperature be preserved. It appears, also, that respiration in the former tribe is more essential to life than in the latter.

Various experiments are next mentioned on the substances which accelerate the cessation of irritability in muscles when applied to their naked fibrils, such as all narcotic vegetables, poisons, muriate of soda, the bile of animals, &c. Discharges of electricity, passed through muscles, destroy their irritability, but leave them apparently inflated with small bubbles of gas, owing, perhaps, to some combination which decomposes water. Workmen who are exposed to the contact of white lead, nitric acid, or quicksilver, frequently experience local spasms or partial palsy.

Lastly, some arguments are adduced which prove that a smaller quantity of blood flows through a muscle in the state of contraction than during its quiescent state; that when muscles are vigorously contracted, their sensibility to pain is nearly destroyed; and that the human muscles are susceptible of considerable changes, from extraordinary impressions on the mind, such as grief, fear, uncommon attention, mental derangement, &c.; in all which cases uncommon muscular exertions have been observed, which could not have been affected without the operation of those stimulants.

Sect. 6.—This section contains some conclusive remarks, chiefly on the effects of stimuli on the muscles, as they are distinguished into voluntary, involuntary, and mixed. For the classification of these agents here stated, we must refer the curious physiologist to the paper itself; having already, perhaps, trespassed too far upon the time that can well be spared for the abstract of this lecture.

Experiments for ascertaining how far Telescopes will enable us to determine very small Angles, and to distinguish the real from the spurious Diameters of celestial and terrestrial Objects: with an Application of the Result of these Experiments to a Series of Observations on the Nature and Magnitude of Mr. Harding's *lately discovered Star. By* William Herschel, *LL.D. F.R.S.* Read December 6, 1804. [*Phil. Trans.* 1805, *p.* 31.]

Dr. Herschel commences his paper by stating, that, being desirous of ascertaining the magnitude of the moving celestial body lately discovered by Mr. Harding, and intending, for that purpose, to make use of a ten-feet reflector, it appeared to him a desideratum highly worthy of investigation, to determine how small a diameter of an object might be seen with that instrument. He had, he says, in April 1774, determined a similar question relating to the natural eye; and found that a square area could not be distinguished from an equal circular one till the diameter of the latter came to subtend an angle of $2' \, 17''$; but, as he did not think it right to apply the same conclusions to a telescopic view of an object, he, in order to